



RUBBER PARK INDIA (PVT) LTD
(A JV of KINFRA & Rubber Board)

2 A, "Kautileeyam", Rubber Park, Valayanchirangara, P.O, Ernakulam, Kerala-683 556.
Tel: (0484) 2657218/ 2655548 | Email: md@rubberparkindia.org | Web: www.rubberparkindia.org

Corrigendum-3: Addendum-1

Tender No: RP/E/T/03/2024-25.

Tender ID: 2024_RPI_690380_2.

Name of Work: Design Supply Installation Testing and Commissioning of Grid Connected Battery Energy Storage System (BESS) of 500 kW/1 MWh at Rubber Park Irapuram., Ernakulam District.

With reference to the tender for the work "Design Supply Installation Testing and Commissioning of Grid Connected Battery Energy Storage System (BESS) of 500 kW/1 MWh at Rubber Park Irapuram., Ernakulam District", the following addendum is proposed in the Tender document.

1. The BESS supplied by the bidder shall be suitable for integration of additional BESS Units, maximum of 4MWH.
2. The Guaranteed Technical Particulars of the BESS is included as Annexure-1.

Please ensure that the above modifications are noted and incorporated into your bid submission.

Dated: 24.09.2024

Place: Irpauram

Sd/-

Managing Director,
Rubber Park India (P) Ltd

| Standard Number | Title |
|---|--|
| IEC 62619 or UL1642 or UL1973 (For Cell) | specifies requirements and tests for the safe operation of secondary lithium cells and batteries used in industrial applications including stationary applications |
| IEC 63056 or UL1642 or UL1973 (For Battery Level) | Secondary cells and batteries containing alkaline or other non- acid electrolytes - Safety requirements for secondary lithium cells and batteries for use in electrical energy storage systems |
| IEC 62620 | Marking, tests and requirements for lithium secondary cells and batteries used in industrial applications including stationary applications |
| IEC 61959 | specifies tests and requirements for verifying the mechanical behavior of sealed portable secondary cells and batteries during handling and normal use |
| IEC 62897 or NFPA 72.A or NFPA 855. | Stationary Energy Storage Systems with Lithium Batteries – Safety Requirements |
| IEC 62281 or UN38.3 (For battery & Cell) | Test methods and requirements for primary and secondary (rechargeable) lithium cells and batteries to ensure their safety during transport other than for recycling or disposal. |
| IEC 62933-5-1 + IEC 62933-5- 2 or UL9540 and UL9540A (BESS Level) | Electrical energy storage (EES) systems - Part 5-1 & 2 : Safety considerations for grid-integrated EES systems – General specification / Standard for Energy Storage Systems and Equipment Electrical energy storage (EES) systems - Part 2- 1: Unit Parameters and testing methods - General Specification. Tests for Class B applications (Duty Cycle Round Trip Efficiency Test, Equipment and Basic Function Test, Available energy Test , Insulation test)- 5-1 + IEC 62933-5-2 IS 17092: Electrical Energy Storage System Safety Requirements |
| IEC 62933-5-4 | Safety test methods and Procedure for grid integrated ESS system-LI Ion based system |
| IEC 62933-2-1 | Electrical energy storage (EES) systems - Part 21: Unit Parameters and testing methods - General Specification Tests - Duty Cycle Round Trip Efficiency Test , Equipment and Basic Function test , Available Energy test , Insulation test |
| IEC 62933-3 | Planning and performance assessment of electrical energy storage systems - Additional requirements for power intensive and renewable energy sources integration related applications |
| IEC/TS 62933-4 | EES Systems - Electrical energy storage (EES) systems - Part 4- 1: Guidance on environmental issues - General specification |
| IEC/TS 62933-5 | Electrical energy storage (EES) systems - Part 5-2: Safety requirements for grid-integrated EES systems - Electrochemical- based systems |
| UL 9540A | Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy |

| Standard Number | Title |
|-----------------------------------|--|
| IEEE 1491 | Guide for selection and use of BMS in stationary applications |
| UL 489 | Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures |
| UL 1741 | Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources |
| IEEE 519 | Recommended Practice and Requirements for Harmonic Control in Electric Power Systems |
| IEEE 1547 | Standard for Interconnecting Distributed Resources with Electric Power Systems |
| IEC 61850 / DNP3 | Communications networks and management systems. (BESS control system communication) |
| IEC 62935 | Planning & Installation of Electrical Energy Storage System |
| RoHS | Restriction of the use of certain hazardous substances in electrical & Electronic equipment |
| UL 1642 | Standard of Lithium Batteries (Safety of Lithium-Ion Batteries) |
| IEC 61508 (For EMS / OS and BMS) | Functional Safety of Electrical/ Electronic/ Programmable Electronic Safety-related Systems: Applicable for all Battery Energy Storage Systems |
| IEEE 2030.2.1-2019 | IEEE Guide for Design, Operation, and Maintenance of Battery Energy Storage Systems |
| IS 17387 | General Safety and Performance Requirement of Battery Management System |
| NFPA 855 | Standard for the Installation of Stationary Energy Storage Systems |
| IEC-60529 | Ingress Protection Testing for Enclosures |

Battery

| Particulars | Remark |
|--|---|
| BESS Useful Power Capacity at Grid Point (11 kV) | 500kW at 0.95 PF and 95% of 11kV |
| Installed Battery Capacity at 25 Deg Cel & Full Load | 1000 kWh |
| Battery Cycles per day | 2 cycles per day |
| Guaranteed complete charge and discharge cycles | 7500 Cycles |
| Battery Type | Lithium ion |
| Battery SubType | Secondary (Rechargeable) |
| Battery Life | 10 Years from Date of Commissioning or 7500 cycles whichever is earlier |
| Min. Battery Energy at the end of 10th Year | 75% of 1st Year Opening Installed Battery Capacity |
| Response Time | 1 Second |
| Battery cell discharge efficiency | >96% |
| Gas Evolution from Battery | None |
| Battery Cooling Type | Air or Liquid |
| Maximum permissible depth of discharge (DoD) | 90% |
| Battery Charging Rate | 0.5C |
| Battery Discharging Rate | 0.5C |
| Battery Power rate | 0.5E |
| Battery lifting/withdrawing arrangement | Suitable arrangement on Module |
| Suitable arrangement on Module | Marking will be done as per IEC 62619 or a. PO Number and Date b. Customer Name- RPIPL c. Manufacturer name, d. Month & year of manufacturing e. Warranty Period f. Nominal voltage g. Rated kWh capacity h. Rated kW capacity i. Cell numbers j. C rate k. Customer Care Number |

| Particulars | Remark |
|--|--|
| Flame Arresters | Each cell / module shall be equipped with flame arrestor to diffuse any flammable gas escaped during charge/discharge |
| Pressure Regulation Valve (PRV) | a. Each cell shall be provided with a pressure regulation valve. b. Valve shall be self sealable and flame retardant. c. Valve unit should not be opened without a proper tool. d. The valve shall be capable to withstand internal cell pressure specified by manufacturer. |
| Terminal polarity marking | Positive and negative marked / embossed on module |
| Battery cell shorting metal links | Nickel plated copper with protective insulating sleeve or comply with UL1973 |
| Insulating shrouds | Required for all battery terminals & shorting links |
| Insulating pads for battery rack - required | At the bottom of rack supports, made from high impact material |
| Min. Battery Energy capacity at the end of 10th Year (% of installed Capacity / rating) | 1st Year – 97.5% 2nd Year – 95.0% 3rd Year – 92.5% 4th year – 90.0% 5th Year – 87.5% 6th year – 85.0% 7th Year – 82.5% 8th Year – 80.0% 9th Year – 77.5% 10th Year – 75.0% |
| IP Rating for battery | IP20 (Indoor) or better |
| Self Discharge per month | < 3% |
| Approved Battery Manufacturer (Bidder to validate that proposed battery complies the IS/IEC.UL/IEEE standards before proposing it to RPIPL.) | Contemporary Amperex Technology Co., Limited. (CATL) LG Energy Solution Panasonic Corporation BYD Company Ltd SAMSUNG SDI CO., LTD SK innovation Tianjin Lishen Battery Joint-Stock Co., Ltd Gotion High tech Co Ltd EVE Energy Co. Ltd Narada Power Amperex Technology ltd (ATL) Any reputed firm |
| Protections | Over and Under Discharge Over and Under Temperature Over and Under Current Over and Under Voltage Ground Fault Internal battery Fault Cell Balancing Battery Fuse for each cell & Module Module reverse polarity DC Contactor for each Battery Rack Grounding Over Current Failure of temperature controller failure of electrolytic system |

Battery Management System

| S.No. | Features | Remarks |
|-------|-------------------------------------|---|
| 1 | User Configuration Login/ Logout | |
| 2 | language | English |
| 3 | Date Time | Display Date Time. Synchronization with GPS Clock. |
| 4 | RunTime | Display D:H:M:S from last outage |
| 5 | Day | Display Day |
| 6 | Firmware Version | Display Firmware Version |
| 7 | Battery Bank Rackwise Status | Charging / Discharging – Status Voltage – Value |
| 8 | | Current – value SoC – Value SoH - Value |
| 9 | Battery Control Unit (BCU) | Contactor PoS Status – Open / Close Contactor Precharge Status – Open / Close |
| 10 | Battery Bank Summary | Voltage – Value Current – Value SoC – Value SoH Value |
| | | Charging / Discharging - Statue |
| | | Bank overall Status - Normal / Abnormal Average Cell Volatge – value |
| | | Average Temperature – Deg Cel Charging Current Limit – value Discharging Current Limit – Value |
| | | Max Temp & Its Location - Value >> Rack >> Module >> Cell No. |
| | | Min Temp & Its Location - Value >> Rack >> Module >> Cell No. |
| | | Max Cell Voltage & Its Location - Value >> Rack |
| | | >> Module >> Cell No. |
| | | Min Cell Voltage & Its Location - Value >> Rack |
| | | >> Module >> Cell No. |
| 11 | | Max Cell Voltage & Its Location - Value >> Module >> Cell No. |
| | | Min Cell Voltage & Its Location - Value >> Module >> Cell No. |
| | | Max Temp & Its Location - Value >> Module >> Cell No. |
| | | Min Temp & Its Location - Value >> Module >> Cell No. |
| | | Charging / Discharging – Status Voltage – Value |

| S.No. | Features | Remarks |
|-------|---|--|
| 11 | Rackwise Status | Current – Value Insulation – Value |
| | | Positive Insulation – Value Negative Insulation – Value |
| | | System Status - Normal / Abnormal Precharge Voltage – Value |
| | | Average Temperature – Value Average Voltage – Value |
| | | SoC – Value SoH – Value |
| | | Positive Status - Open / Close Precharge Status – Open / Close Negative Status – Open / Close Disconnecter – Open Close Charging Current Limit – Value Discharging Current Limit – Value |
| 12 | RackWise Alarms (Normal / Warning / Alarm / Critical) | Cell Voltage High Cell, Voltage Low, Total Voltage High, Total Voltage Low |
| | | Charging Overcurrent, Discharging Overcurrent, BMU Communication Fail, BMU Fault |
| | | HVB Temp High Charging Temp High Charging Temp Low Discharging Temp High Discharging Temp Low Insulation Low |
| | | Terminal Temp High Contactor Faulty |
| 13 | Rackwise / Batterywise Cell Voltage | Module 1 to n >> Cell No 1 to n >> Voltage Value for each cell |
| 14 | Rackwise / Batterywise Temperature | Module 1 to n >> Cell No 1 to n >> Temp Value for each cell |
| 15 | Module Positive Point Temperature | Module 1 to n >> temp Value |
| 16 | Rackwise Warning Limit / Alarm Limit and Critical Limit Setup | Total Voltage High Total Voltage Low Charging Overcurrent |
| | | Discharging Overcurrent Insulation Low |
| 17 | | Cell Voltage High Cell Voltage Low Charging Temp High Charging Temp Low |
| | | Discharging Temp High Discharging Temp Low HVB Temp High |
| 18 | Rackwise Alarm Info | Date>>Time>>Alarm Values>>Alarm Description |
| | | Rack Connection Status - Connected / Disconnected |
| | | Rack Status - Enable / Disable Operate Command - Disable / Enable |

| S.No. | Features | Remarks |
|--|------------------------|---|
| 19 | BCU Operation | Error Code - High Voltage Difference, Type 1 Fault, type 2 Fault, High Cell Voltage, Low Cell Voltage, System Status Stop |
| | | Connection Operate - Command with Status Minimum Parallel Numbers of Rack - Value with Status |
| | | Emergency Stop Electrical Status - Normal / Abnormal |
| 20 | Configure Type 1 Fault | High Cell Voltage Alarm Low Cell Voltage Alarm |
| | | Cell High Temp Discharge Alarm Cell Low Temp Discharge Alarm Cell High Temp charge Alarm Cell Low Temp charge Alarm |
| 21 | | Module terminal Over temperature Alarm High Temp of BCU Power Connection |
| 22 | Configure Type 2 Fault | High Rack Voltage Alarm or Critical Alarm High Cell Voltage Critical Alarm |
| | | Low Rack Voltage Alarm or Critical Alarm Low Cell Voltage Critical Alarm |
| | | Cell High Temp Discharge Critical Alarm Cell low Temp Discharge Critical Alarm Cell High Temp charge Critical Alarm Cell Low Temp charge critical Alarm |
| | | Charge Over current alarm or critical alarm Discharge Over current alarm or critical alarm Low insulation resistance alarm or critical alarm |
| | | Module terminal Over temperature Critical Alarm |
| | | High Temp of BCU Power Connection Critical BAU & EMS Communication failure |
| | | BCU & BAU Communication failure BCU & BMU Communication failure BMU Hardware failure |
| | | Contactors failure |
| | | BCU Hardware failure BAU Hardware failure Current Sensor Failure |
| Insulation sampling failure Isolation switch Off | | |

| S.No | Parameters | Requirement of RPIPL |
|------|--|---|
| 1 | Installation Type | Indoor / Outdoor |
| 2 | Cooling Type | Forced Air / Liquid Cooled |
| 3 | User Interface HMI | Min 8 inch Touchscreen LCD |
| 4 | Communication | Modbus TCP, DNP 3.0 |
| 5 | Type of AC & DC Side Disconnection | Breaker |
| 6 | Nominal power (SN(AC)) at 35 °C | Minimum Capacity > 2 MVA |
| 7 | Max. Total Harmonic Distortion (Amp) | Total < 3%, Individual < 1.5% |
| 8 | Efficiency | Max. Efficiency > 98%, Round Trip > 95% |
| 9 | IP Rating | IP66 for Outdoor Application |
| 10 | | IP20 or Better for Indoor Application |
| 11 | AC & DC side Surge Arrestor | Type 2 as standard |
| 12 | Noise Level | Maximum noise level – 75dBA |
| 13 | Operating Temperature | 0°C to 50° C ambient Temperature and 95% non-condensing Humidity |
| 14 | Output current DC injection | Less than 0.5% of nominal load Current |
| 15 | Frequency Range | 47.5 Hz to 52 Hz |
| 16 | Protection Systems (Illustrative list) | Thermal Overload |
| | | Insulating monitoring ground fault Over Voltage : DC & AC Side |
| | | Under Volatge : DC & AC Side Over Current : DC & AC Side Over and Under Grid Frequency Over Temperature |
| | | Short Circuit |
| | | Surge Protection (Power, Control & Signal Cables) Lightening Protection |

| S.No | Parameters | Requirement of RPIPL |
|------|---|---|
| | Protection Systems (Illustrative list) | Surge Voltages induced on AC & DC Side due to external source |
| | | Islanding & Anti Islanding as per IEC 62116 Internal Fault e.g Logic failure |
| | | Neutral point high resister grounding type (DC side) for ground fault alarm shall be provided |
| | | EMS requirement as per IEC61000 or equivalent standard |
| | | Protection against any fault in feeder / load line Earth leakage faults |
| 17 | | Shock, Energy, Fire, Mechanical & Other Hazards |

Distribution Transformer

| Sl. No. | Item | 11 kV Distribution Transformer |
|---------|-----------------------|---|
| 1 | System voltage (Max.) | 12 kV |
| 2 | Rated Voltage (HV) | 11 kV |
| 3 | Rated Voltage (LV) | 433 -250 V |
| 4 | Frequency | 50 Hz +/-5% |
| 5 | No. of Phases | Three |
| 6 | Connection HV | Delta |
| 7 | Connection LV | Star (Neutral brought out) - Cable Termination Type |
| 8 | Vector group | Dyn-11 |
| 9 | Type of cooling | ONAN |

| RING MAIN UNITS | | |
|---------------------------------------|---|---|
| GENERAL TECHNICAL REQUIREMENTS | | |
| Sl.no: | Description | Requirement |
| 1 | Network | 3 phase, 3wire |
| 2 | Rated Voltage | 12 kV |
| 3 | Service Voltage | 11 kV |
| 4 | System frequency | 50 Hz |
| 5 | Bus bar rating | 630 A |
| 6 | Min. operating temperature | -25 degree C |
| 7 | IP Rating | IP 67 for SF6 breaker unit IP 54 for outdoor enclosure including cable entry box cover. |
| 8 | Internal Arc test | IEC60298 |
| 9 | Lightning impulse withstand voltage | 75kV |
| 10 | Power frequency impulse voltage | 28 kV rms – 1 minute |
| 11 | Rated normal current | |
| | (i) Load Break Switches | 630 A |
| | (ii) Feeder Circuit Breaker | 630 A |
| 12 | Rated short-time current with stand (3 sec) for Ring switch & Earthing switch | 20 KA |
| 13 | Rated breaking capacity of Breaker of CTC unit | 20 KA for 3 sec |
| | | 25 KA for 1 sec |
| 14 | Rated short circuit-making capacity of Load break switches and Earthing Switches | 52 kA peak at rated voltage |
| 15 | Number of operations at rated short circuit current on Load Break Switches, Earthing Switches and Circuit Breaker | 5 closing operations for switches and 10 operations for Circuit Breaker |
| 16 | <u>Rated load interrupting current</u> Load Break Switches | 630 A |
| 17 | Voltage indicator device | The live status of all the cable terminated in RMU shall be indicated |
| 18 | CT Ratio | 100/1 A |
| 19 | Cable Compartment | Suitable for 11kV, 3x300 sq.mm XLPE cable |
| 20 | Compatible for 61850 operations | Yes |